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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,838	08/15/2001	David T. Amm	SLM-06400	1401

28960 7590 09/25/2002
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EXAMINER

JUBA JR, JOHN

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 09/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/930,838

Applicant(s)

AMM ET AL.

Examiner

John Juba

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period of Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 15-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-14 and 31-37 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1 – 14 and 31 - 37, drawn to a variable diffraction grating, classified in class 359, subclass 573.
- II. Claims 15 - 30, drawn to a method of a variable diffraction grating, classified in class 216, subclass 24.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product can be made by etching a sacrificial layer to form suspended planar, rather than blazed element, and subsequently patterning additional layers atop the planar elements to form the blaze profile.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and because the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Thomas B. Haverstock on September 19, 2000 a provisional election was made without traverse to prosecute the invention of I, claims 1 – 14 and 31 - 37. Affirmation of this election must be made by applicant in replying to this Office action. Claims 15 – 30 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

An action on the merits of the elected invention follows:

Drawings

The drawings are objected to because Figure 13 has mistakenly been labeled "FIG. 16". A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

Claims 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 is ambiguous as to whether the two orders are zero as a first order and any other order as "a" second order or the two orders are particularly zero and one of the $\pm 2^{\text{nd}}$ orders (*i.e.*, one of the $+2^{\text{nd}}$ order or -2^{nd} order). Claim 11 contains the same ambiguity by virtue of its dependency from claim 10.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1, 2, 4 – 7, 14, and 37 are rejected under 35 U.S.C. 102(e) as being anticipated by Sweatt, et al (U.S. Patent Application Publication number US 2002/0105725 A1). Referring *primarily* to Figures 8 and 9, along with the associated text, Sweatt, et al disclose a light modulator comprising the recited structure and operable between a mode diffracting light into a single diffractive order (single-blazed

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configuration of Fig. 9b) and a mode diffracting light into at least two orders (superimposed configuration of Fig. 9c).

With regard to claim 14, the claim includes "means-plus-function" recitations. It is clear from the "three-prong analysis" (Federal Register/Vol. 65, No. 120, pp. 38510 - 38516; June 21, 2000) that the claim indeed invokes 35 USC §112, sixth paragraph. As there is no express *definition* of the means associated with each of the functions recited, the associated structure then turns on what one of ordinary skill would identify as the structure for performing the recited function. In the instant case, the functions "diffracting an incident light into at least two diffractive orders" corresponds to the disclose^d electrostatically deflectable reflective elements. The examiner finds that the prior art electrostatically deflectable reflective elements perform the same function, in substantially the same way, and produce substantially the same results with the specificity recited. Thus, the deflectable reflective elements of Sweatt, et al are *prima facie* functional equivalents of the claimed means. Similarly, both the instant "means for adjusting the means for diffracting" and the prior art adjusting means rely upon a controllable electrostatic potential. Thus, the examiner finds these means to be equivalents. See also *Micro Chem., Inc. V. Great Plains Chem. Co., Inc.*, 194 F.3d 1250, 52 USPQ.2d 1258 (Fed. Cir. 1999):

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In construing claims drafted in § 112, ¶ 6 form, "[t]he statute does not permit limitation of a means-plus-function claim by adopting a function different from that explicitly recited in the claim. Nor does the statute permit incorporation of structure from the written description beyond that necessary to perform the claimed function."

Claim 37 invokes §112, sixth paragraph. Sweatt, et al disclose the various embodiments as capable of performing the functions of reflecting or diffracting at an adjustable angle. The examiner finds the electrostatically deformable reflective elements (*e.g.*, Figs. 3 & 4) to be *prima facie* equivalent means to the means disclosed.

Claims 1, 2, 4, 12, and 14 are rejected under 35 U.S.C. § 102(e) as being anticipated by Brazas, Jr., et al (U.S. Patent number 6,181,458). Referring *primarily* to Figures 10 and 11 and the associated text, Brazas Jr, et al disclose a light modulator comprising the recited structure and operable between a mode Fig. 10) diffracting light into at least two orders (positive and negative first order), and a mode (Fig. 11) diffracting light into a single diffractive order (the zero order). It will be appreciated that Figure 11 does not illustrate specular reflection, but rather *diffraction* into the zeroth order. The electrostatic adjusting means performs the recited function in substantially the same manner as the means disclosed. Since the means disclosed for diffracting light into at least two orders comprises reflective surfaces at different elevations, the examiner finds the reflective surfaces of Brazas, Jr., et al, which are also at different elevations, to be a functional equivalent of the means disclosed.

Claims 31 – 37 are rejected under 35 U.S.C. 102(e) as being anticipated by Kowarz, et al (U.S. Patent number 6,172,796). Referring to the discussion of Figures

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10 – 12, Kowarz, et al disclose a modulator comprising reflective, conductive, elongated elements operable in variable groupings of at least three movable elements to either reflect light, diffract light into a single order at an angle θ , or to diffract light into a different angle ($-\theta$). The examiner regards the electrostatic deflection of Kowarz, et al to a *prima facie* functional equivalent of the means disclosed for performing the adjusting function.

With regard to claim 33, Kowarz, et al disclose metal as a conductor (Col. 6, lines 62 – 65), and then teach that the reflective layer (78) is conductive.

With regard to claim 36, individual elements of the respective groupings are subjected to individual electric biases (Col. 7, lines 15 – 50).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brazas, Jr., et al, in view of Bornstein, et al (U.S. Patent number 5,661,592). As set forth above for claims 1 and 2, Brazas, Jr., et al disclose the invention substantially as claimed. However, Brazas, Jr., et al do not disclose first and second posts coupling the elongated elements to the substrate.

In the same field of endeavor, Bornstein, et al disclose a diffractive modulator comprising a plurality of elongated elements. Bornstein, et al teach that, instead of a "frame", when posts used to support the elongated elements, the elongated elements are self-supporting and a number of benefits ensue, including an improved contrast ratio, attributable in part to reduced proximity effects of the electric field applied to the elongated elements.

It would have been obvious to one of ordinary skill to replace the support frame of Brazas, Jr., et al with support posts, in the interests of improving the contrast ratio, as suggested by Bornstein, et al.

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§ 103(a)

Claim 8 is rejected under 35 U.S.C. ¹103(a) as being unpatentable over Sweatt, et al, in view of Feldman, et al (U.S. Patent number 6,071,652). As set forth above for claims 1 and 5, Sweatt, et al disclose the invention substantially as claimed. However, Sweatt, et al disclose a multi-level blazed surface on the elongated elements, and do not disclose a single surface, inclined with respect to the grating plane.

In the same field of endeavor, Feldman, et al disclose blazed surfaces which are a single, continuous, inclined surface. Feldman, et al teach that a gray-scale mask can be used in a single photolithographic step to synthesize a blazed surface with greater control over the feature depth, and with fewer alignment errors, than accompany multi-level implementations.

It would have been obvious to one of ordinary skill to render the blaze surfaces of Sweatt, et al as single, continuous, and inclined surfaces, in the interest of forming the profile in a single exposure step, without the alignment errors that accompany the multi-level implementation, as suggested by Feldman, et al.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sweatt, et al, in view of Brazas, Jr., et al. Much in the manner set forth above for claims 1 and 5 – 7, Sweatt, et al disclose the modulator comprising elongated elements having surface profiles which are blazed by the arrangement of at least two adjacent parallel surfaces. By moving selected ones of the elongated elements, the modulator is operable between a mode diffracting light into a single order, and a mode diffracting light into at least two orders. Thus, Sweatt, et al disclose the invention substantially as claimed. However, it is the multiple-order mode, rather than the single-order mode of Sweatt, et al that is accomplished by biasing the elongated elements, to move them into position, as recited.

In the same field of endeavor, Brazas, Jr., et al disclose modulator embodiments operable between a multiple-order diffracting mode and a single-order diffracting mode. By reference to the teachings of the embodiment of Figures 8 and 9 versus the embodiment of Figures 10 and 11, Brazas, Jr., et al teach the equivalence of an embodiment in which elements are moved from a single-order quiescent state to diffract into at least two orders and an embodiment in which the elements are moved from a multi-order quiescent state to achieve single order diffraction.

It would have been obvious to one of ordinary skill to arrange the elongated elements of Sweatt, et al to diffract into multiple orders in their quiescent state, and to require an electrical bias to move them to a single-order diffractive state, because such was known in the prior art to be an equivalent configuration. One of ordinary skill would have appreciated that the modified arrangement would have required less energy to operate in applications, where the single-order operation was required less frequently.

Allowable Subject Matter

Claim 9 is are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 10 and 11 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

The prior art, taken alone or in combination, fails to teach or to fairly suggest, a plurality of elongated elements cooperating between a single-order diffraction mode and a multi-order diffraction mode, particularly wherein the grating pitch is two-times the width of an elongated element, as recited in claim 9. The prior art does not teach or suggest division of surface areas and elevations to operate in this manner.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Islam, et al (U.S. Patent number 6,445,502) disclose an electrostatically variable blazed grating.

Pilossof, et al (U.S. 2002/0015230 A1) disclose diffractive modulators operable between reflection and single-order diffraction, the gratings including inclined surfaces or a staircase blaze implementation.

Lee, et al (U.S. 2002/0079432 A1) disclose operation of a conventional DMD to achieve a blaze condition, and employ a second order in Littrow.

Guerra, et al (U.S. Patent number 6,396,789) disclose a multilevel diffractive optical element on a deformable support.

Pilossof (U.S. 2002/0021485 A1) discloses a variable blazed diffraction grating.

Godil, et al (U.S. Patent number 6,268,952) disclose an electrostatically adjustable grating device.

Hawkins, et al (U.S. Patent number 6,252,697) disclose a deformable grating having standoffs.

Castracane (U.S. Patent number 5,999,319) discloses a programmable grating operable between two and four diffractive orders.

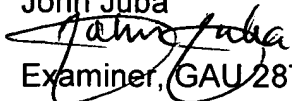
D. M. Burns, et al (*Sensors and Actuators*) disclose an electrostatically variable blazed grating.

NASA's Jet Propulsion Laboratory (*NASA Tech Briefs*) disclose a multilayer diffractive optical element on a deformable membrane.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (703) 308-4812. The examiner can normally be reached on Mon.-Fri. 9 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on Mon.- Thu., 9 - 5. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

John Juba

Examiner, GAU 2872

JJ
September 20, 2002